In the Claims

The listing of claims presented below will replace all prior versions and listings of claims in the Application:

1. (Currently Amended) ~~An interferometer system for a~~ A one-way QKD system, comprising:

a first QKD station that emits a quantum signal and a control signal and ~~having~~ that has a first interferometer loop;

a second QKD station optically coupled to the first QKD station via an optical fiber link and ~~having~~ that has a second interferometer loop and a detection stage operably coupled to an output of the interferometer loop, wherein the second interferometer loop has an arm with a phase shifter;

a polarization control stage arranged immediately upstream of the second QKD station;

a controller coupled to the detection stage and the phase shifter; and

wherein the quantum signal and the control signal traverse the same path through the first interferometer loop, the optical fiber link, the polarization control stage and the second interferometer loop, and wherein the control signal is detected by the detection stage and is used by the controller to actively adjust the phase shifter to ~~perform phase-stabilization of~~ phase-stabilize the second interferometer loop.

2. (Original) The system of claim 1, wherein the control signal and the quantum signal have the same wavelength.

3. (Presently Amended) A method of stabilizing a QKD system having a first interferometer loop at a first QKD station and a second interferometer loop at a second QKD station, comprising:

sending a control signal and a quantum signal from the first QKD station to the second QKD station over ~~the~~ an ~~same~~ interferometric path ~~of the QKD system to the second QKD station, including over the~~ that includes the first and second interferometer loops and an optical fiber link that optically couples the first and

second QKD stations;

detecting first and second interfered control signals ICS1 and ICS2 at the second QKD station and calculating a ratio ICS1/ISC2;

detecting first and second interfered quantum signals IQS1 and IQS2 at the second QKD station and finding an extremum of a ratio IQS1/IQS2; and

adjusting a phase in an arm of the second interferometer loop based on a value of the ratio ICS1/ICS2 corresponding to the extremum of the ratio IQS1/IQS2.

4. (Original) The method of claim 3, wherein the arm of the second interferometer includes a phase shifter driven by a voltage, and including dithering the voltage to maintain the ratio IQS1/IQS2 as constant.

5. (Original) A method according to claim 3, wherein the quantum signal and the control signal have the same wavelength.

6. (Presently Amended) A method of stabilizing a QKD system, comprising:

sending a control signal and a quantum signal from a first QKD station to a second QKD station over the same interferometric optical path of an interferometer;

detecting first and second interfered control signals ICS1 and ICS2 at the second QKD station and calculating a ratio ICS1/ISC2;

determining a value of the ratio ICS1/ICS2 that corresponds to a maximum quantum signal count; and

adjusting a phase of the optical path to maintain said ratio value.

7. (Original) The method of claim 6, wherein adjusting the phase includes providing varying amounts of voltage to a phase shifter in a loop of the interferometer.

8. (Original) The method of claim 6, wherein the maximum quantum signal count is determined by a maximum of a ratio of interfered quantum signals detected at the second QKD station.

9. (Original) The method of claim 6, wherein the quantum signal has a first wavelength, the control signal has a second wavelength.

10. (Original) The method of claim 9, wherein the first and second wavelengths are the same.

11. (Presently Amended) A method of stabilizing a QKD system, comprising:

sending a control signal and a quantum signal from a first QKD station to a second QKD station over the same <u>interferometric</u> optical path of an interferometer;

using the control signal to determine a maximum count of the quantum signal; and

adjusting a phase of the optical path based on the control signal to maintain the maximum quantum signal count.

12. (Original) The method of claim 11, wherein adjusting the phase includes adjusting a voltage of a phase shifter in the optical path.

13. (New) The system of claim 1, wherein the second interferometer loop is the only interferometer loop in the second QKD station, and wherein the second interferometer loop includes at least one adjustable phase shifter.

14. (New) The system of claim 13, wherein the at least one phase shifter provides a stabilizing phase shift in response to a stabilization signal.

15. (New) The system of claim 13, including dithering the stabilization signal to maintain a maximum set point for the quantum signal.

16. (New) The system of claim 1, wherein the polarization control stage includes a polarization scrambler and a polarizing beam splitter.

17. (New) The method of claim 3, wherein the second interferometer loop is the only interferometer loop in the second QKD station.

18. (New) The method of claim 11, further comprising:

providing at least one phase shifter arranged in an interferometer loop in the second QKD station; and

providing a stabilization signal to the at least one phase shifter to adjusting an amount of phase shift in the optical path.

19. (New) The method of claim 18, further comprising dithering the stabilization signal.

20. (New) The method of claim 11, further comprising forming the control signal so that the control signal need not be detected by a single-photon detector.